Multiphysics materials modeling from atoms to continuum: A symposium in honor of Professor Sidney Yip

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For over four decades, Sidney Yip has made numerous important contributions to the theory and simulation of dense fluids and solids. His seminal work has greatly advanced our understanding of neutron scattering theory, liquid dynamics and transport, solid stress relaxations, and has shed light on atomic-level mechanisms governing diverse phenomena such as melting, crack-tip plasticity, amorphization, grain-boundary and dislocation dynamics, and thermal transport. Recently he has also led efforts to provide a first-principles basis for ground- and excited-state properties in the modeling of ideal strength, electrical transport, actuation, and material chemomechanics at quantum mechanical levels. These atomic-level insights are incorporated into the understanding of complex material behavior such as crystal plasticity, strength and toughness of nanostructured materials, and response to nanoindentation. The increase in complexity from unit processes to complex material behavior necessitates taking a multiscale and multiphysics approach. Prof. Sidney Yip will nominally retire from MIT in the summer of 2009, making the tenth National Congress on Computational Mechanics an opportune time for the modeling community to review what have been accomplished, and what need to be done towards physics-based descriptions of material behavior and phenomena. The symposium welcomes contributions at all levels of materials modeling, including electronic-structure, atomistic, mesoscale and continuum level approaches, as well as the development of coarse-graining methods and analytic theories.